CLOUD DISSIPATED BY KITE.

J. A. RILEY, Meteorologist.

[Weather Bureau Office, Broken Arrow, Okla., Sept. 14, 1923.]

On July 29, 1923, during a kite flight at the Broken Arrow, Okla., station one of the kites caused a rift in a layer of thin clouds as the kite was being lowered through it. This phenomenon may be of interest in connection with recent reports of rain making and cloud dissipating by airplane.

The clouds on this morning were predominately alto-cumulus with some patches of very small fleecy balls that would have been recorded as cirro-cumulus from their appearance had not their altitude been determined by the kites. A very thin alto-stratus veil spread among the more compact masses of alto-cumulus.

The kites were obscured by this thin cloud layer as they were being reeled in, when presently one of the kites cast its shadow on the clouds; this shadow was visible to the observers at the reel house for perhaps two minutes. Then the kite entered the cloud stratum and a rift in the cloud began. It rapidly lengthened in the lee of the kite and looked as if the kite were a plow making a long straight furrow in the cloud. The opening was somewhat wider than the kite and more than 2,000 feet long as determined by angular measurements, when it was closed by the kite being lowered out of the cloud. The rift was visible as a straight dark line for several minutes afterward as it drifted away.

Contrasted with this dissipating of clouds is the formation of cloud bands by the passage of airplanes through previously clear air of high humidity, as recorded in "The Argonne Battle Cloud."[1] The two processes are not necessarily related however. The evaporation of the cloud particles is undoubtedly the result of the deflective action of the kite on the air passing through it.

The clouds were 2,800 meters high, with a velocity of 8 m. p. s. from the west, and a temperature of 7° C. (45° F.). Below the cloud there was a nearly normal lapse rate of temperature; above there was a sharp but limited inversion. As the kite entered this inversion layer this warm air was deflected down into the cloud with the result that the cloud particles were evaporated.[2]

The total amount of cloudy condensation evaporated was, of course, relatively small; it is only because the cloud stratum was very thin that an opening in it was made. Usually the clouds are far too thick to be affected by the small deflection in the air caused by the kite.

Streaks in the clouds have previously been observed during kite flights, twice at Mount Weather, Va., and once each at Drexel, Nebr., and Ellendale, N. Dak.[3]

Mr. V. E. Jakl states that—

> This phenomenon has come under my observation twice. In the case of Drexel on July 9, 1917, and at Ellendale on January 15, 1918, we find in the former case an abrupt inversion and drop in humidity at about the level where the streak started downward. In the Ellendale case, the tabular record shows no inversion, but shows increasing humidity and formation of alto-cumulus up to the level where the streak was observed to begin. In both these cases it appears that the kite was far below the cirro-stratus in which the streak was observed. However, what appeared to have been a streak in the cirro-stratus might have been simply greater visibility developing in a line in a thin stratum of air where cloudiness was incipient, this greater visibility evidently caused by the evaporation of the tenuous clouds, similar to the dissipation of the actual clouds observed at Broken Arrow.
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> The electrical theory mentioned by Dr. Blair (MO. WEATHER REV., June, 1917) seems plausible enough, in the light of recent experiments on dissipation of clouds by charged sand, but has the objection that if this were so we would observe the streak phenomenon more often, and when observed, it should be more permanent.

[1] MO. WEATHER REV., June, 1921.

[2] At the cloud level the lapse rate was about 0.9° C. per 100 m. as shown by the record, or approximately adiabatic. Hence the atmosphere at this level was nearly in neutral equilibrium. Clearly, then, the downward deflection of the air carried that portion of the cloud just beneath the kite to a considerably lower and warmer level. Furthermore the loss of heat, due to the evaporation of the depressed cloud, slightly increased the distance of fall and consequent ultimate warming of the descending air.—*W. J. H.*

[3] MO. WEATHER REV., June, 1917. 45: 269-270; and SUPPLEMENTS No. 11, p. 5, and No. 12, p. 6.

FORECASTING RAIN ON THE WEST TEXAS COAST.

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[Weather Bureau, Corpus Christi, Tex., Sept. 6, 1923.]

Rainfall, the most important meteorological element in most regions, becomes doubly important on the west coast of Texas, since the relatively small amount received annually bears an important relation to the yield of crops. It is very important, therefore, that weather forecasters have a thorough knowledge of the subject in order that those rather infrequent rains may be accurately forecast for the benefit of farmers.

An effort has been made by the writer to determine the character of the atmospheric disturbances that most frequently cause precipitation in this region, and to this end a careful study of the most important rains has been made, the period under discussion being the years from 1902–1922, inclusive. Only the rains that were of material benefit to crops have been selected, those amounting to 1 inch or more in 24 hours.

A striking feature of these heavy rains has been the fact that the great majority of them have occurred with the prevalence of a north or northeast wind—48 per cent of the rains occurring with these wind directions. The north wind predominates with rains of 1 inch or more in 24 hours, being 28 per cent of the total. Northeast winds give 20 per cent of the rains, while east and southeast each have 18 per cent, south 9 per cent, southwest 2, west 1, and northwest 4 per cent.

The question now arises: What is the character of the atmospheric disturbance causing these heavy rains, and what location must it have with reference to this locality in order to give precipitation? In the great majority of cases the rain-producing LOW overlies the Rio Grande Valley, with a well defined HIGH to the northeast. Often a Gulf disturbance will be the cause of the great rains of this region, but these disturbances frequently move inland and become Rio Grande LOWS, so it may be assumed that the majority of the rain-producing disturbances are of the latter type. Any depression that moves far south, especially in winter, and comes through New Mexico, thence to south-central Texas, may cause precipitation on this coast, but there are many instances where the LOW will swing northeastward through northern Texas after reaching the vicinity of Roswell, New Mexico, and when this happens it becomes either a "dry LOW" for this region, or one with very little precipitation. When, however, a large HIGH impinges on one of these western LOWS in the Rio Grande Valley north and northeast winds result, with an abundance of